Air Force Corrosion Prevention and Control Office (AFCPCO)

Army Corrosion Summit 2-6 Feb 2009

Ms. Kimberly Andrews
AFCPCO (AFRL/RXSSR)

U.S. Air Force Corrosion Prevention and Control Office
Design
Prevention
Detection
Control

AFRL
THE AIR FORCE RESEARCH LABORATORY
LEAD I DISCOVER I DEVELOP I DELIVER

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Overview

- Mission/People
- Accomplishments
- Current Efforts
- GWoT Projects
- Future Plans

AFCPCO Mission

Air Force Corrosion Prevention and Control Office

Mission

Ensure the Air Force has an effective program to prevent, detect, and control corrosion and minimize the impact of corrosion on Air Force combat capability.

Directed by HQ USAF: Manage AF Corrosion Maintenance Program

(AFI 21-105, Air and Space Equipment Structural Maintenance, Apr 03)

- Engineering and Technical Assistance
- Engineering Responsibility for 6 Technical Orders
- Corrosion Surveys of Major Commands and Weapon Systems
- Weapon System Corrosion Prevention Advisory Boards
- Host Annual USAF Corrosion Conference
- Support Corrosion Training
- Facility Requirements for Corrosion Maintenance
- Cost of Corrosion Studies
- Transition Corrosion Technologies to Users

Customers:

- Field Units

- Major Commands

- System Managers

- Air Logistics Centers

- AF Research Laboratory

AFRL

AFCPCO Supports AFRL/RX Mission

- AFCPCO provides:
  - Bridge between developers and users
  - Transition of technologies from laboratory to field
  - Key part of RX's commitment to meet user needs
- AFCPCO contributes to:
  - RX Mission: "…Provide the Air Force with new or improved materials, processes…"
  - RXS Mission: "Systems Support to AF Product Centers, Logistics Centers, and Operating Commands…"
  - AFRL Core Strategy B: Demonstrate and Transition Technology
  - RX Core Technology Area 10: System Support
    - Direction 10.1: Corrosion Control
  - RX Sustainment IAA
    - Technology Area: Corrosion

AFCPCO Personnel

- **Government**
  - Major Robert Reed — Office Chief
  - VACANT, DR-III — Deputy Office Chief
  - Dave Ellicks, DR-II — Sr. Materials Engineer
  - Kim Andrews, DR-II — Materials Engineer
  - CMSgt Ronald Allison — AF Corrosion Program Manager
  - SMSgt Scott Ward — AF Corrosion Program Manager
  - Capt. Daniel Doak — Mechanical Engineer
  - 2nd Lt. David Rail — Mechanical Engineer
  - Issie Kennedy, GS-6 — Management Assistant

- **Engineering and Technical Support Contractors (S&K Technologies)**
  - Owen Jett (CMSgt Ret) — Senior Project Manager
  - Wes Barfield — Senior Materials Engineer
  - Mac McKenna (CMSgt Ret) — Senior Maintenance Analyst
  - Mark Foley (SMSgt Ret) — Senior Maintenance Analyst
  - Kevin Wilson (MSgt Ret) — Senior Maintenance Analyst
  - Ruth Jett — Senior Maintenance/Data Analyst
  - Jeff Hatfield — Systems Analyst/Network Administrator
  - Beverly Dillard — Administrative Assistant

- **Liaison contractors**
  - Jerry Powell (SMSgt Ret) — Air National Guard Liaison
  - Larry Cornwell (Cmdr Ret, USCG) — C-5 Corrosion Program Support
  - Linda Santorelli (MSgt Ret) — OSD CPC IPT Admin

RXSSR Corrosion Prevention & Control Office (Government)

Maj Robert Reed
Office Chief

VACANT
Deputy Office Chief

Issie Kennedy
Management Asst.

Kim Andrews
Materials Engineer

David Ellicks
Sr. Materials Engineer

CMSgt Ron Allison
Corrosion Program Manager

Capt Dan Doak
Mechanical Engineer

Lt David Rail
Mechanical Engineer

SMSgt Scott Ward
Corrosion Program Manager

RXSSR Corrosion Prevention & Control Offic (Contractors)

Owen Jett
CMSgt (ret)
Sr Project Manager

“Mac” McKenna
CMSgt (ret)
Sr Maint Analyst

Mark Foley
SMSgt (ret)
Sr Maint Analyst

Kevin Wilson
MSgt (ret)
Sr Maint Analyst

Wes Barfield
Sr Materials Engr

Ruth Jett
Sr Maintenance/
Data Analyst

Jeff Hatfield
Systems
Analyst/Network
Administrator

Beverly Dillard
Administrative
Assistant

Linda Santorelli
MSgt (ret)
Administrative
Assistant

Corrosion Prediction/Management

Definition of Basing Environments

- Unique exposure racks measuring corrosion rates of 5 alloys in different configurations in >150 USAF sites from Antarctica to SW Asia deserts
- Used to determine frequency of preventive maintenance actions
- Joint Service and DOD Facilities Use

On Aircraft Cumulative Environmental Exposure Sensors

- >400 sensors flying on 7 platforms
- Basis for Corrosion Inspections and Preventive Maintenance tailored to individual aircraft exposure
- Provides verification of corrosion prediction models
- Allows detection of spills and anomolous corrosion exposures

Corrosion Mitigation

Aircraft Sheltering Studies

- Quantified reductions in corrosion rates
- Reductions in corrosion maintenance based on measured severities
- Provides basis and support for aircraft shelters for corrosion mitigation

Aircraft Wash/Rinse Optimization Studies

- Unique observed affects of washing on outdoor exposure panels
- On aircraft wash cycle study (C-130's at Mansfield OH & Long Island NY)
- Affects of aircraft rinse cycles (C-130s/H-60's at Patrick AFB FL)
- Potential of extended wash cycles at no cost to corrosion in specific environments

Technical Orders

- We now fully own six AF general series corrosion-related technical orders (versus technical management only)
  - Pervasive -- apply to all systems
  - Referenced by all other corrosion TOs
- Primary means to transition technology to AF-wide use
- Continual effort to update as needed
  - Ensure maintainers use best materials and processes--increase combat capability, reduce maintenance time & cost, protect people & assets, comply with environmental restrictions
- Available publicly at http://www.robins.af.mil/library/technicalorders.asp

Technical Orders

- TO 1-1-8, Application and Removal of Organic Coatings, Aerospace and Non-Aerospace Equipment
- TO 1-1-686, Desert Storage Preservation and Process Manual For Aircraft (NAVAIR 15-01-4, TM 55-1500-331-34)
- TO 1-1-689, Avionics Cleaning and Corrosion Prevention/Control (NAVAIR 16-1-540, TM 1-1500-343-23)
- TO 1-1-691, Aircraft Weapon Systems Cleaning and Corrosion Control (NAVAIR 01-1A-509, TM 1-1500-344-23)
  - **New chapter written on corrosion prevention and control in SWA AOR**
- TO 1-1-700, Corrosion Prevention and Control, Ground Communications - Electronic Equipment (C-E)
  - **Published Jan 07**
- TO 35-1-3 Corrosion Prevention, Painting and Marking of USAF Support Equipment (SE)
    - **Full rewrite completed FY07**
- All updates available at AFCPCO website prior to publication**:** **https://www.my.af.mil/gcss-af/afp40/USAF/ep/globalTab.do?command=org&pageId=681742&channelPageId=-1986143**

Corrosion Surveys

- Required for each MAJCOM, every 5 years
- Completed AFSOC survey in FY07, ACC was scheduled but postponed...new dates TBD
- Assess overall health of programs -- NOT an inspection
- Provided on-site assistance
- Outbriefed base and MAJCOM maintenance leadership, published final report
- Findings:
  - Good, comprehensive command instructions
  - Excellent condition of aircraft
    - One exception: structural patches
    - Recommended Sempens or brush/roller
  - Some unauthorized paints, cleaners, sealants
  - Good QA and training programs, but need better coordination with appointed Wing Corrosion Mgrs
  - Improvement needed: support equipment prev MX

Air Force Corrosion Conference

- Purpose: crossflow & resolve issues across entire Air Force corrosion prevention and control community
- Largest DoD corrosion conference:
  Over 500 participants: all MAJCOMs, ALCs, SPOs, over 120 field units, all sister services, HQ USAF, AFRL, industry
- 39th annual conference held 6-8 Mar 2007
- 2008 conference planned for 4-7 Mar 2008

Cost of Corrosion Study

- AFCPCO conducted Air Force-wide collection/analysis of corrosion cost
  - Aircraft, vehicles, equipment, munitions, space systems
  - Not real property (AF OPR is Civil Engineering)
- Cost of documented, direct corrosion control maintenance
  - Repair, treatment, washing, painting, depainting, sealing (conservative)
  - Not intangibles (availability, readiness, training, safety)

Total Costs, Then Yr Dollars			
1990	**1997**	**2001**	**2004**
$720	$795	$1,139	$1,497

AF O&M Budget, Then Yr Dollars			
1990	**1997**	**2001**	**2004**
$25,160	$22,728	$29,328	$38,406

Total Costs, Adjusted to 2004 $'s			
1990	**1997**	**2001**	**2004**
$926	$857	$1,175	$1,497

AF O&M Budget, adjusted to 2004 $'s			
1990	**1997**	**2001**	**2004**
$32,342	$24,512	$30,246	$38,406

Corrosion Cost Growth as a Constant Compounding Rate
5.23%

Corrosion Proportion of AF O&M Budget			
1990	**1997**	**2001**	**2004**
2.86%	3.50%	3.88%	3.90%

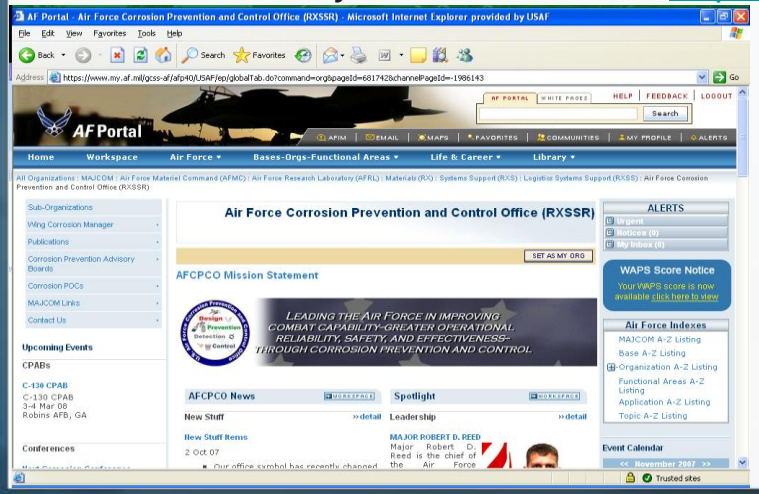
Fleet Size Study Year			
8,722	5,991	6,075	6,066

Corrosion Prevention Advisory Boards

- Each aerospace system required to establish CPAB, hold annual meetings
- Purpose: bring system designer, program office, MAJCOM corrosion managers, field corrosion representatives together to discuss and resolve corrosion issues unique to their weapon system
- SPO chairs CPAB and directs corrosion program for its system (SPO is engineering authority)
- AFCPCO is technical support, advising on most effective methods, materials, and processes for that specific system
  - We participate in approximately 20 CPABs/year
- More emphasis being placed on Corrosion Mitigation Plans as required by DFARs change last year

Information Management, Dissemination, and Feedback

- Biggest hurdle is communication
  - Many corrosion needs have some known answers
  - Many unauthorized or damaging processes being used
- Customer feedback and needs identification via:
  - Surveys, CPABs, conferences, direct contact (phone/e-mail)
  - Corrosion newsletter to SPOs
- Best dissemination tool is Web site: **https://www.my.af.mil/gcss-af/afp40/USAF/ep/globalTab.do?command=org&pageId=681742&channelPageId=-1986143**
- Publicly releasable info on http://www.corrdefense.org



- **Survey & project reports**
- **Cost of Corrosion Studies**
- **Qualified Product Lists**
- **Technical Orders**
- **Message traffic**
- **Material selection Info**
- **Event schedules**
- **Specifications**
- **Points of contact**
- **Links to partner organizations**
- **Meeting minutes**
- **Training & technical info**

AFCPCO Contractual Efforts

- Ongoing/Recently Completed (Core, P2, GWoT $)
  - AFCPCO Engineering and Technical Support
  - Flight Test of Deft Non-Chrome Primer
  - Mitigate Corrosion Risk to Deployed Aircraft's Circuit Boards
  - High-Pressure Water Blasting for AGE Corrosion Prevention
  - Deployable Clear-water Rinse (Recyclable) System
  - Demonstrate Benefits of Sheltering/Dehumidification for AGE
  - AGE AOR Corrosion Survey and Mitigation

GWoT Projects

SKT Contract Background

- S&K Technologies Inc
  - A Salish & Kootenai Tribally Owned Enterprise
  - SBA 8(a) Certified
  - Home Office located at Saint Ignatius MT
- Current IDIQ (F09650-03-D-0001) initiated in April 2003.
  - IDIQ is a 5-year contract with a 3-year extension option.
  - Initial paperwork has been sent to WR Contracting to begin extension process.
- Ceiling is $495M.Current value is approx. $70M

MEC Contract Background

- Founded in 1990 by the Mandan, Hidatsa, and Arikara Nations of the Three Affiliated Tribes of the Fort Berthold Indian Reservation in North Central North Dakota
- Mandaree Enterprise Corporation headquarters located in Mandaree, North Dakota
- Small Disadvantaged Business, located in a HUBZone area
- Current IDIQ (FA8501-06-D-0001) was awarded by Warner Robins ALC in March 2005.
  - Allows for a basic year with nine (1) – one year options.
- Ceiling Price - $75M .Current value is approx. $19.7M

MEC Support

- Sustainment Engineering Services in Support of OSD Corrosion Research and Development Projects
- MEC Employees include Program/Project Management, Engineering/Technical, Financial, and Administrative
- Supports OSD, USAF Corrosion Prevention and Control Office, Air Logistics Centers in the Maintenance of USAF Systems and Equipment

Clear Water Rinse (Recyclable) System for Corrosion Prevention

Objective

- **Prototype a rapidly deployable mobile clear water rinse system to protect support equipment in harsh SWA desert conditions**

- **Identify closed-loop system that needs only initial water charge with appropriate power source**

- **Work with manufacturer to make system procurable by deploying units**

Finance

Contract F09650-03-D-0001, Delivery Order 5021 (S&KT)
Period of Performance: 31 Mar 08

PE	Funds			FY06	Total
78070F	GWoT			300	300

Payoffs

Improvements in equipment service life, structural integrity, and mission readiness

Reduce cost of maintaining & repairing support equipment

Implement new processes to resolve problems encountered under desert conditions for clear water rinses

Southwest Asia Deployed Asset Corrosion Survey

Objective

- To reduce the detrimental impact of the SWA environments on USAF managed support equipment
- Research databases to ascertain equipment with highest corrosion repairs/issues
- Conduct on-site equipment and maintenance processes capability assessments at deployed locations
- Support the Air Force SPM by providing information necessary to change corrosion-related technical data and depot level work processes and procurement activities.

Finance

Contract F09650-03-D-0001, Delivery Order 5021 (S&KT)
Period of Performance: 31 Mar 08

PE	Funds			FY06	Total
78070F	GWoT			350	350

Payoffs

Reduce cost of maintaining & repairing support equipment

Provide recommendations for improvements to maintain integrity and readiness of systems

Implement new processes to resolve problems encountered under desert conditions

Southwest Asia Deployed Asset Corrosion Survey

- Team of AFCPCO, 578 CBSS, & contract personnel visited SWA locations April 07
  - Al Udeid, Qatar
  - Al Dhafra, UAE
  - Ali Al Salem, Kuwait
  - Manus, Kyrgyzstan
  - Bagram Afghanistan
- Final Report will be completed by Feb 08

Clear Water Rinse (Recyclable) System for Corrosion Prevention

- Best candidate system identified
  - Riveer Company
- System installed at Holloman AFB NM and being used daily by 49th FW personnel
  - Holloman location simulates SWA environment
  - Operational parameters same as in SWA
- Quarterly site visits by AFCPCO and Riveer personnel
- Several modifications performed to optimize system
  - Wash pad configuration
  - Ozone generator
  - Upgraded power supply

Demonstrate Benefits of Sheltering for Corrosion Prevention

Objective

- **Evaluate the benefits of sheltering for AGE in severe environments such as SWA desert conditions**
  - **Corrosion**
  - **Paint coating system (gloss, color, service life)**

- **Provide ROI documentation so field units have justification to purchase shelters**

Finance

Contract F09650-03-D-0001, Delivery Order 5021 (S&KT)
Period of Performance: 31 Mar 08

PE	Funds			FY06	Total
78070F	GWoT			480	480

Payoffs

Reduce cost of maintaining & repairing support equipment

Increase availability of critical aircraft support assets

Demonstrate Benefits of Sheltering for Corrosion Prevention

- Shelters assembled at Pease ANGB NH and Savannah ANGB GA
  - Existing shelters at Holloman AFB also used for project
  - Corrosion monitoring equipment (sensors, test racks, temperature/humidity recorders, etc) installed on equipment stored inside shelters and on equipment exposed to outside environment
  - Two different types of individual equipment covers also being evaluated at Savannah
- Quarterly visits by AFCPCO personnel to collect and download data
  - Significantly lower corrosion rates identified at all locations – even at Holloman's very mild environment
- Final report will be completed in Mar 08

High Pressure Water Blasting for Support Equipment

Objective

- **Investigate the use of high-pressure water blasting to remove paint and corrosion from support equipment**

- **Evaluate water blasting technologies**

- **Identify specific equipment and procedures**

- **Add requirements in applicable technical orders**

Finance

Contract F09650-03-D-0001, Delivery Order 5021 (S&KT)
Period of Performance: 31 Mar 08

PE	Funds			FY06	Total
78070F	GWoT			300	300

Payoffs

Provide approved technology to resolve corrosion problems on support equipment

Reduce cost of maintaining & repairing support equipment

High Pressure Water Blasting for Support Equipment

- Existing equipment ("Aquamiser") at Eglin AFB FL available for evaluation and data collection
  - Arranging site visit
- Literature search on-going to identify potential ESOH issues, and other equipment manufacturers and users
- Final report complete Mar 08

Mitigate Corrosion Risk to Aircraft Circuit Boards

Objective

- **Reduce environmental contamination and corrosion risk to avionic Line Replacement Units (LRUs)**

- **Coordinate with MLSA to identify contaminants and remediation measures**

- **Document procedures in applicable technical orders**

Finance

Contract F09650-03-D-0001, Delivery Order 5021 (S&KT)
Period of Performance: 31 Mar 08

PE	Funds			FY06	Total
78070F	GWoT			250	250

Payoffs

Improvements in equipment service life, structural integrity, and mission readiness.

Reduce cost of maintaining & replacing LRUs

Determine “hot spots” for “failure prone” electrical systems

Future Initiatives

- Development of integrated AF corrosion strategy
  - To meet requirements of DoDI 5000
  - Progress towards a focused enterprise view on corrosion prevention
- Develop a Air Force Corrosion Prevention Advisory Board (AFCPAB) made up of AFRL, AFCESA, AFCA, AQR and A4M
- Consolidate guidance/policy and technical data (eliminate redundancy and seams)
- Incorporate policy to make corrosion aspects of system acquisitions a necessary part of the Lifecycle Management of those system
- Develop common data collection system--interface with Expeditionary Combat Support System (ECSS)
- Provide web-based method to increase cross talk between functional areas

AFCPCO FIVE-YEAR VISION

- Stable funding meeting budget requirements, in POM and FYDP
- Permanent government staff sufficient for our taskings (current staff is insufficient for core mission)
- Pursuing field test/dem/val/prototype projects to transition mature technology into Air Force maintenance operations to meet highest priority AF needs
- Participating in comprehensive, AF-wide, validated technology needs documentation and screening process
- Annual customer needs assessment of MAJCOMs, SPDs, ALCs; direct efforts accordingly

Visit our web site for latest information!

- https://www.my.af.mil/gcss-af/afp40/USAF/ep/globalTab.do?command=org&pageId=681742&channelPageId=-1986143

Questions???